

Claims

- [c1] Claim 1
A liquid crystal display, comprising:
liquid crystal cells for forming an image display area on a substrate;
a driver for applying a voltage to said liquid crystal cells using a plurality of driver ICs; and
an LCD controller for processing signals received from a host's side and supplying the processed signals to said driver ICs, wherein said driver delays the start timing for writing said liquid crystal cells among the plurality of driver ICs respectively to avoid the concentration of current consumption.
- [c2] Claim 2
The liquid crystal display according to claim 1, wherein said driver is characterized in that the plurality of driver ICs are mounted on said substrate and power is supplied to the plurality of driver ICs via a physically continuous wiring line.
- [c3] Claim 3
The liquid crystal display according to claim 1, wherein said driver applies a voltage to said liquid crystal cells such that the driver ICs sequentially drive the liquid crystal cells starting from the downstream one located farthest away from a power source towards the upstream ones close to the power source.
- [c4] Claim 4
The liquid crystal display according to claim 1, wherein said LCD controller outputs timing setting data that indicates delay time for the plurality of driver ICs to start writing of said liquid crystal cells.
- [c5] Claim 5
The liquid crystal display according to claim 1, wherein said LCD controller outputs serialized control data signal that includes an output start signal indicative of start timing of outputting to the liquid crystal cells and a polarity select signal indicative of polarity of the liquid crystal output.
- [c6] Claim 6

A liquid crystal display, comprising:
liquid crystal cells for forming an image display area on a substrate; and
a plurality of driver ICs which are supplied power by means of bus connections
or cascade connections on the substrate and each including a timer that
operates according to time information from an LCD controller, wherein each of
the plurality of driver ICs is set start timing for writing said liquid crystal cells
respectively and measures the write start timing by using said timer, and
wherein the driver IC that meets the conditions starts writing of said liquid
crystal cells sequentially.

[c7] Claim 7

The liquid crystal display according to claim 6, wherein said write start timing
respectively set is determined dependent on a wiring capacity of a power supply
line for each of the driver ICs.

[c8] Claim 8

A liquid crystal display, comprising:
liquid crystal cells for forming an image display area on a substrate; and
a plurality of driver ICs that are connected continuously from a power source to
be supplied power and perform writing of said liquid crystal cells sequentially,
wherein said driver ICs monitor a voltage drop of a power supply line and start
writing of said liquid crystal cells such that the voltage drop does not fall below
a predetermined reference voltage drop.

[c9] Claim 9

The liquid crystal display according to claim 8, wherein said predetermined
reference voltage drop is set close to a minimum voltage of a potential
difference signal that is measured when the driver IC itself performs writing of
said liquid crystal cells.

[c10] Claim 10

A liquid crystal display driver for performing writing of liquid crystal cells that
form an image display area by applying a voltage thereto, the driver comprising:
a setting register for storing information about write delay time for delaying
write timing of said liquid crystal cells;

a counter for counting said write delay time stored in said setting register;
a sequencer for activating a delayed output start signal based on an output from said counter; and
a control circuit for controlling the writing of said liquid crystal cells based on said output start signal activated by said sequencer.

[c11] Claim 11

The liquid crystal display driver according to claim 10, wherein said setting register reads timing setting data output from an LCD controller and stores information about said write delay time.

[c12] Claim 12

The liquid crystal display driver according to claim 10, wherein said setting register reads a control data signal output from an LCD controller based on timing of a control strobe signal output from the LCD controller.

[c13] Claim 13

A liquid crystal display driver for applying a voltage to liquid crystal cells forming an image display area for writing, comprising:
means for measuring a potential difference on a power supply line;
means for setting a reference voltage drop; and
means for controlling start timing for writing said liquid crystal cells based on the reference voltage drop and the measured potential difference.

[c14] Claim 14

The liquid crystal display driver according to claim 13, wherein the reference voltage drop is set close to a minimum voltage of a potential difference across an internal power supply line that is measured when said driver itself performs writing of said liquid crystal cells such that drive current necessary for the driver itself is assured.

[c15]

Claim 15

An LCD controller for processing signals received from a host's side and supplying the processed signals to a plurality of driver ICs in a timed manner, the LCD controller comprising:

means for outputting timing setting data that represents delay time for said driver ICs to start outputting to liquid crystal cells; and
means for outputting a control strobe signal to count said delay time stored in said driver ICs according to said timing setting data.

[c16] Claim 16

The LCD controller according to claim 15, wherein said timing setting data output means outputs said timing setting data represents delay time to said liquid crystal cells starting from the downstream driver IC located farthest away from a power source.

[c17] Claim 17

The LCD controller according to claim 15, wherein said timing setting data output means outputs said timing setting data during a period when video data is not being transferred.

[c18] Claim 18

The LCD controller according to claim 15, further comprising means for serial transferring to said driver ICs as control data signals an output start signal for starting a liquid crystal output and a polarity select signal indicating a polarity of the liquid crystal output.

[c19] Claim 19

A method for driving a plurality of driver ICs that are provided on a substrate on which liquid crystal cells are formed, wherein the driver ICs apply a writing voltage to the liquid crystal cells and are supplied power in a single stroke of the brush fashion, the method comprising the steps of:
setting write start timing for applying the writing voltage to said liquid crystal cells for each of said plurality of driver ICs;
counting according to predetermined time information; and
applying the writing voltage to said liquid crystal cells sequentially from the driver IC that has reached said write start timing.

[c20]

Claim 20

The method according to claim 19, further including the step of setting said

write start timing based on timing setting data, which is sent from an LCD controller controlling said plurality of driver ICs just in the same procedure as video data.

[c21]

Claim 21

A method for driving a plurality of driver ICs that are provided on a substrate on which liquid crystal cells are formed, wherein the driver ICs write to the liquid crystal cells and are supplied power in a single stroke of the brush fashion, from the upstream one towards the downstream one, the method comprising the steps of:

measuring a voltage drop on a power supply line of the individual driver ICs of said plurality of driver ICs;

comparing the measured voltage drop to a predetermined reference voltage drop; and

turning off the writing of said liquid crystal cells for the individual driver ICs when the measured voltage drop is below said predetermined reference voltage drop.

[c22]

Claim 22

The method according to claim 21, further includes the step of operating the driver ICs located upstream, with respect to the power supply line, starts writing of the liquid crystal cells after downstream driver ICs start writing.